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effecting planarization by polishing at least said second insulation film,
wherein said first insulation film includes a silicon dioxide material containing at least 1% of carbon.--

REMARKS

Claims 3-14, 16-27, 31 and 32 are pending. Claims 3, 4, 7-11, 13, 17, 18 and 26 are amended, and new claims 31 and 32 are added.

As a preliminary matter, claims 3, 4, 9-14, 16-18 and 20-25 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite (paragraph 24 of the Office Action). It is believed that the amended claims are in full compliance with 35 USC § 112. In particular, the present amendment corrects the informalities noted by the Examiner.

Claims 3, 4, 7, 8, 11, 13, 14, 16, 24 and 25 were rejected under 35 USC § 102(e) as being anticipated by Shepard. Favorable reconsideration of this rejection is earnestly solicited.

Claim 8 is an independent claim, wherein the remaining claims in the rejection either directly or indirectly depend from claim 8. Claim 8 requires that the first insulation film includes a silicon dioxide material containing at least 1% of carbon.

Shepard does not disclose that the insulation film includes a silicon dioxide material containing at least 1 % of carbon. As such, Shepard fails to anticipate claim 8 or the claims depending therefrom.

Claims 3, 7, 8, 11, 13, 14, 18, 22, and 24- 25 were rejected under 35 USC § 102(e) as being anticipated by Jang et al. In this rejection, claim 8 is the only independent claim.

As noted above, claim 8 requires that the first insulation film includes a silicon dioxide material containing at least 1% of carbon. Jang et al. fails to teach or suggest this limitation. As such, the claims are not anticipated by Jang et al.

Claim 18 was rejected under 35 USC § 102(b) as being anticipated by Yu et al. Favorable reconsideration of this rejection is earnestly solicited.

Claim 18 has been amended to depend from claim 19 which has been allowed. As such, this rejection has been overcome.

Claims 9, 10, 12, 20, 21 and 23 were rejected under 35 USC § 103(a) as being unpatentable over Shepard. Favorable reconsideration of this rejection is earnestly solicited.

Claims 9 and 10 have been amended to depend from new claim 32. New claim 32 contains all of the limitations of independent claim 8 and further specifies that the first insulation film includes at least an SOG film. Shepard fails to teach or suggest that after argon ions as impurities are introduced to a surface of an organic SOG film as the first insulating film, planarization is effected by polishing. Shepard discloses that after boron or phosphorous ions are implanted to a silicon oxide film formed using TEOS as the material by CVD method, planarization is effected.

The present invention is directed to an improvement of the process of achieving a favorable planarized surface of an appropriate level by planarization using an SOG film and then polishing the planarized surface by CMP for further planarization. In contrast, the process disclosed by Shepard is directed to planarization using only silicon oxide film formed with a material of TEOS by CVD method.

According to the present invention, it is possible to achieve a favorable planarized surface of an appropriate level by planarization using an SOG film as well as to embed an insulating film

in microminiature interconnection without any gap, in comparison with using an insulating film formed by CVD method. Furthermore, the polishing rate of the SOG film is improved while preventing defects from being generated in the surface of the SOG film by polishing after previously implanting impurities such as argon ions into the SOG film. Such effects are not disclosed or suggested by the cited art.

Claims 26 and 27 were rejected under 35 USC § 103(a) as being unpatentable over Jang et al. Favorable reconsideration of this rejection is earnestly solicited.

Claim 26 has been amended to set forth that the first insulation film includes at least an SOG film. Jang et al. fails to teach or suggest that after argon ions introduced to a surface of an organic SOG film as a first insulation film, that planarization is effected by polishing. In Jang et al. nitrogen ions are implanted through an SOG film to an SiO₂ layer formed by CVD process so that the resultant stop layer is formed in the SiO₂ layer. In the process disclosed by Jang et al., although planarization is effected using an SOG film, Jang et al. is silent about introducing impurities into the SOG film. Jang et al. fails to teach or suggest the above-effects associated with the present invention.


For at least the foregoing reasons, the claimed invention distinguishes over the cited art and defines patentable subject matter. Favorable reconsideration is earnestly solicited.

Should the Examiner deem that any further action by applicants would be desirable to place the application in condition for allowance, the Examiner is encouraged to telephone applicants' undersigned attorney.

In the event that this paper is not timely filed, applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 01-2340.

Respectfully submitted,

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Attachment: Information Disclosure Statement

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